



A new spider species of the genus *Proshermacha* (Mygalomorphae: Anamidae) from the Coolgardie and Murchison bioregions of Western Australia, collected on a Bush Blitz expedition

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Abstract

The open-holed trapdoor spider genus *Proshermacha* Simon, 1908 (Anamidae) currently contains ten species. The genus is known to occur from south-western Western Australia, through southern South Australia and into western Victoria. Here, we describe the first species from semi-arid Western Australia, from Credo Station Reserve and surroundings. Several specimens of this species, including the holotype, were collected on a Bush Blitz expedition to Credo Station Reserve, in 2011.

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Introduction

The Australian-endemic genus *Proshermacha* Simon, 1908 (Anamidae Simon, 1889) currently includes ten named species of open-holed trapdoor spiders. *Proshermacha* species make burrows with an open entrance, sometimes opportunistically making use of natural crevices under rocks and logs (MSH, pers. obs.). All described species are from south-western Western Australia or South Australia, including one from Termina-

tion Island, in the Recherche Archipelago off Western Australia's south coast. Although this distribution is predominantly mesic, some species, including the species described here, have adapted to semi-arid and arid habitats (Harvey et al. 2018).

Although the genus is now well defined and characterised both molecularly and morphologically (see Harvey et al. 2018), significant revisionary work is still required at the species level. Of the ten previously

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described species, males have only been described for *P. tepperi* (Hogg, 1902) (see Main 1964, 1976) and *P. wilga* Leenders, Beach & Harvey, 2023 (see Leenders et al. 2023). Seven other species are described based solely on females without adequate diagnoses, images, or drawings (Hogg 1902; Main 1954; Rainbow and Pulleine 1918), and the type species, *P. subarmata* Simon, 1908 is described based on a juvenile. Due to these issues, our species diagnosis here is somewhat limited in taxonomic scope. However, because recent morphological and phylogenetic work indicate that species of *Proshermacha* are generally short-range endemics (Harvey et al. 2018), and because this species occurs in a markedly different habitat, over 400 kilometres from the nearest described species, we believe its description is justified as an important initial step in documenting the Australian *Proshermacha* fauna using a modern integrative approach.

In this study we describe a new species, *Proshermacha credo* sp. nov., from the Coolgardie and Murchison bioregions of Western Australia. The holotype of this species, along with several paratype specimens, was collected on the 2011 Bush Blitz expedition to Credo Station Reserve. Bush Blitz is a program run by the Australian government in partnership with Broken Hill Proprietary Company Limited (BHP) and Earthwatch Australia to document plants and animals from conservation reserves across Australia and facilitate the description of new species (see Preece et al. 2015).

Methods

Proshermacha credo sp. nov., was delimited and described using an integrative species concept (*sensu* De Queiroz 2007), considering its morphological diagnosability (where possible), molecular distinctiveness, and its geographical isolation from other described species in the genus. All specimens examined in this study are deposited in the Western Australian Museum, Perth (WAM), and are preserved in 70% ethanol. Digital automontage images were taken at the Queensland Museum Collections & Research Centre (CRC), Hendra, using a Leica M165C stereomicroscope with mounted DFC425 digital camera and processed using Leica Application Suite software (ver. 3.7). Measurements are in millimetres, to one decimal place. Leg segments were measured along the dorsal prolateral edge with the leg in lateral view. Total body length measurements were made in dorsal view and include the chelicerae, carapace and abdomen, but not the spinnerets. Female genitalia were cleared in lactic acid at room temperature before examination and imaging. The following abbreviations are used in species descriptions, and refer to taxonomically informative measurements of the male leg I, following Castellanelli et al. (2020): TIL, tibia I length; TID, tibia I depth (or width); TIS, tibia I length from base to distal face of spur; TISH, height of tibia spur (excluding megaspine); MIL, metatarsus I length; MID, metatarsus I depth (or width).

For material examined, coordinates for collection localities have been rounded to the nearest minute. Mygalomorph spiders in Australia are currently the subject of significant illegal collecting for the wildlife pet trade (e.g. Marshall et al. 2022), and specific coordinates are excluded for this reason.

The sequence data associated with the species in this study have been analysed previously in a phylogenetic analysis of the Anamidae (Harvey et al. 2018) and *Proshermacha* (Leenders et al. 2023) and the position of *P. credo* sp. nov. in the phylogeny can be seen in that study, under the code name *Proshermacha* sp. 'MYG435'.

Taxonomy

Proshermacha credo sp. nov.

Figures 1–30

<https://zoobank.org/NomenclaturalActs/9646946E-ADEF-47AE-9292-9110C1FE348F>

Holotype

AUSTRALIA: *Western Australia*: ♂, Credo Station, site Cs 4, 30°16'S, 120°42'E, 6 September 2011, M.S. Harvey, T.A. Parkin (WAM T114998).

Paratypes

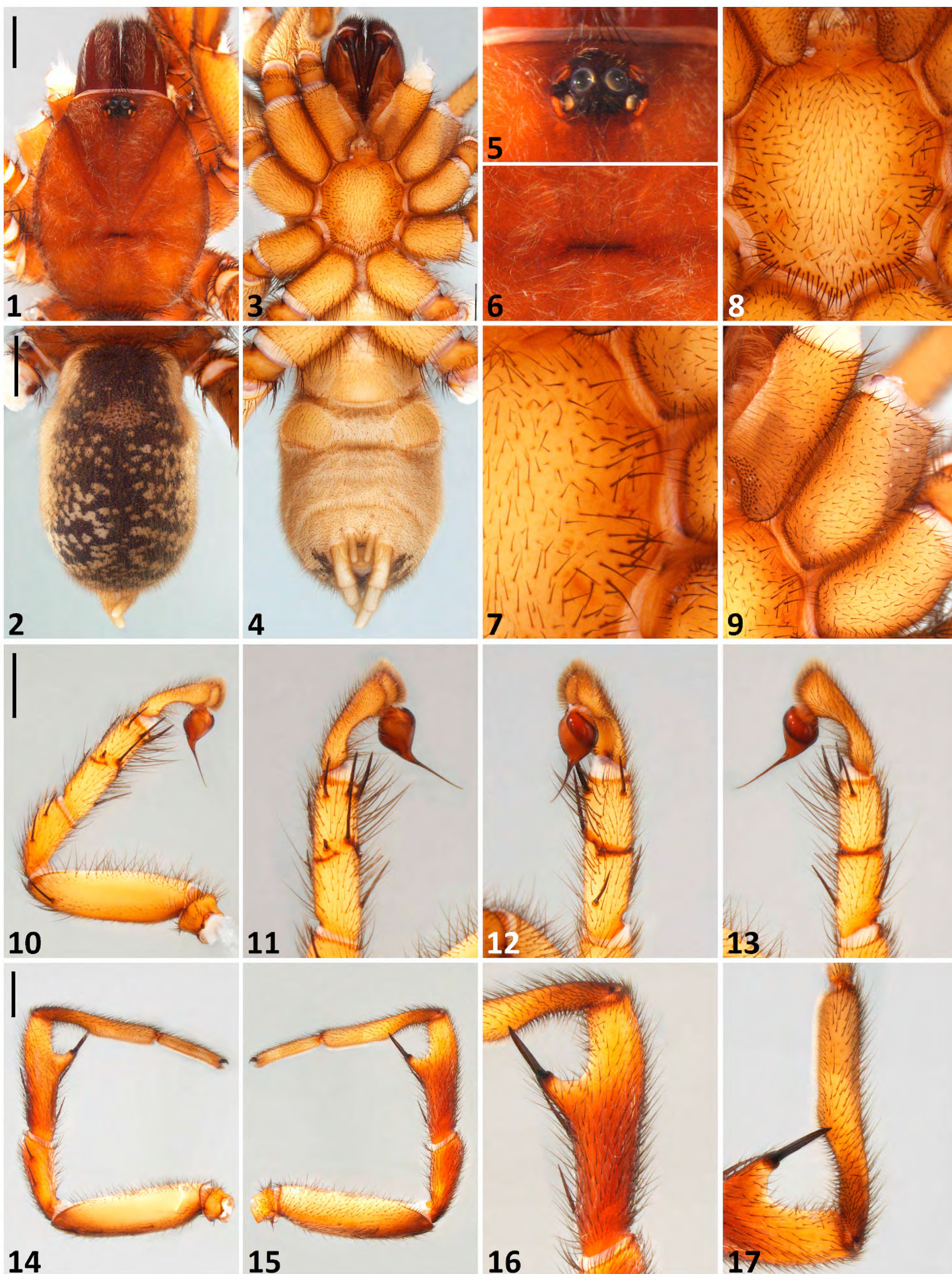
AUSTRALIA: *Western Australia*: 1 ♂, Credo Station, ca. 100 km NW. of Kalgoorlie, 30°21'S, 120°43'E, 30 August 2011, M.A. Cowan (WAM T116019); 1 ♂, Credo Station, site Cs 4, 30°19'S, 120°42'E, 4 September 2011, M.A. Cowan, T.A. Parkin (WAM T115544); 1 ♂, same data except 5 September 2011 (WAM T118993); 1 ♂, same data except 30 August 2011, T.A. Parkin (WAM T118636).

Other Material

AUSTRALIA: *Western Australia*: 1 ♂, ca. 44.8 km SSE. of Menzies, 30°05'S, 121°10'E, 1–9 November 2018, J. Turpin (WAM T149155); 1 ♂, same data (WAM T149156); 1 ♀, Mt Ida, 100 km WSW. of Leonora, site MI-07-7C, 29°14'S, 120°26'E, 26 July 2008, M. Quinn, G. Murray (WAM T110238); 1 ♂, same data except site MI-08-8D, 29°13'S, 120°26'E, 29 July 2008 (WAM T110249).

Diagnosis

Diagnoses within the genus *Proshermacha* are problematic because males have only been described for two of the ten described species (*P. tepperi* and *P. wilga*), and informative images are also only available in the literature for two species (*P. armigera* and *P. wilga*). Until holotypes of all previously described species are examined, diagnoses within the genus will be limited. However, because *P. credo* sp. nov. is over 400 km from the type locality of all described species, and in a different bioregion, we can be confident that it is new and warrants description. Below we provide a preliminary diagnosis of *P. credo* sp. nov. from the few species for which images are available in the literature.



Figures 1–17. *Proshermacha credo* sp. nov., holotype male (WAM T114998): 1, cephalothorax, dorsal view; 2, abdomen, dorsal view; 3, cephalothorax, ventral view; 4, abdomen, ventral view; 5, ocular region; 6, fovea; 7, left sternal sigilla; 8, sternum; 9, left maxilla and anterior coxae; 10, left pedipalp, prolateral view; 11, left pedipalp, tibia and tarsus, prolateral view; 12, left pedi-

palp, tibia and tarsus, ventral view; 13, left pedipalp, tibia and tarsus, retrolateral view; 14, left leg I, prolateral view; 15, left leg I, retrolateral view; 16, tibia I, retrolateral view; 17, metatarsus I, retrolateral view. Scale bars = 2 mm.

Males of *Proshermacha credo* sp. nov., can be tentatively distinguished from males attributed to *P. tepperi* (based on drawings in Main 1964, 1976) by the pedipalp tibia, which is thinner and less ovoid (Figs 10–13). They can be distinguished from *P. wilga* by possessing a much thinner tibia and metatarsus of leg I and a more porrect tibial megaspur (Figs 16, 17). Males are currently unknown for all other described species of *Proshermacha*.

Females of *Proshermacha credo* sp. nov., can be distinguished from *P. armigera* by their spermathecae, which are less elongate (Fig. 29; cf. Harvey et al. 2020, fig. 156), and from *P. wilga* by the spermathecae being only moderately medially directed (Fig. 29). Females of *P. credo* cannot currently be distinguished from other species of *Proshermacha* for which adequate diagnoses, descriptions and images are not yet available.

Description – male holotype (WAM T114998)

Dimensions (mm): total body length (with chelicerae, but excluding spinnerets) 19.6. Carapace length 8.4, width 6.9; abdomen length 8.2, width 5.2. Leg I: femur 6.7; patella 4.1; tibia 5.3; metatarsus 5.5; tarsus 2.9.

Colour (in alcohol) (Figures 1–17): carapace uniformly orange-brown; leg I bicoloured, patella and tibia orange-brown, femur, metatarsus and tarsus yellow brown; legs II to IV uniformly yellow brown; chelicerae red-brown; ventral prosoma tan-brown; abdomen dorsally grey-brown with pale mottled chevrons and ventrally pale yellow-brown.

Carapace, chelicerae, abdomen (Figures 1 – 6). Carapace 1.22 x longer than broad; pilose; silver hairs present, with bristles centrally and on clypeus; clypeal edge slightly convex; fovea straight. Eye group rectangular (width/length 1.94), on distinct tubercle. Chelicerae without rastellum. Abdomen 1.58 x longer than wide, lightly pilose.

Mouthparts and sternum (Figures 7 – 9). Labium width/length 1.94, without cuspules. Left maxilla with 60–65 cuspules, confined to medial edge. Coxae without cuspules. Sternum length/width 1.09; with setae over entire surface; with 3 pairs of sigilla, each pair increasing in size from anterior to posterior; all pairs close to sternum margin; posterior pair thin and elongate.

Pedipalp (Figures 10–13): tibia cylindrical, narrow length/width 3.31; retrolateral face with 5 strong spines clustered in distal half, ventral face with 1 strong spine proximally, prolateral face with 1 strong spine distally, dorsal face with 2 strong spines positioned proximally and medially; cymbium elongate, length/width 3.78, medially constricted and broadest distally; scopula present distally; bulb ovoid; embolus straight, thin, about 1.7x longer than bulb.

Leg I (Figures 14–17): Tibia I moderately thickened; with large megaspur; TIL/TID 4.15; TIS/TIL 0.63; TISH/TID 0.85; metatarsus incrassate, with proximal excavation; MIL/MID 6.55; MIPEL/MIL 0.53; scopulae present on tarsus and distal metatarsus.

Description – female (WAM T110238)

Dimensions (mm): total body length (with chelicerae, but excluding spinnerets) 28.3. Carapace length 9.2, width 7.7; abdomen length 13.8, width 8.8. Leg I: femur 7.3; patella 4.3; tibia 5.6; metatarsus 5.5; tarsus 2.8.

Colour (in alcohol) (Figures 18–29): carapace uniformly orange-brown; legs, chelicerae, and ventral prosoma concolorous; ventral prosoma tan-brown; abdomen dorsally grey-brown with pale mottled chevrons and ventrally pale yellow-brown.

Carapace, chelicerae, abdomen (Figures 18–23). Carapace 1.18 x longer than broad; virtually glabrous; clypeal edge slightly convex; fovea straight. Eye group rectangular (width/length 1.97), on distinct tubercle. Chelicerae without rastellum. Abdomen 1.56 x longer than wide, lightly pilose.

Mouthparts and sternum (Figures 24–26). Labium width/length 2.14, without cuspules. Left maxilla with 75–80 cuspules, confined to medial edge. Coxae without cuspules. Sternum length/width 1.09; with setae over entire surface; with 3 pairs of sigilla, each pair increasing in size from anterior to posterior; all pairs close to sternum margin; posterior pair thin and elongate.

Leg I (Figures 27–28): Spination, femur 2 (1PL, 1 D), patella 2 (2PL), tibia 8 (3PL, 1V and 4RL), metatarsus 7 (4PL, 3RL), tarsus 0, total 19; metatarsus length/width 6.74; scopulae present on tarsus and metatarsus.

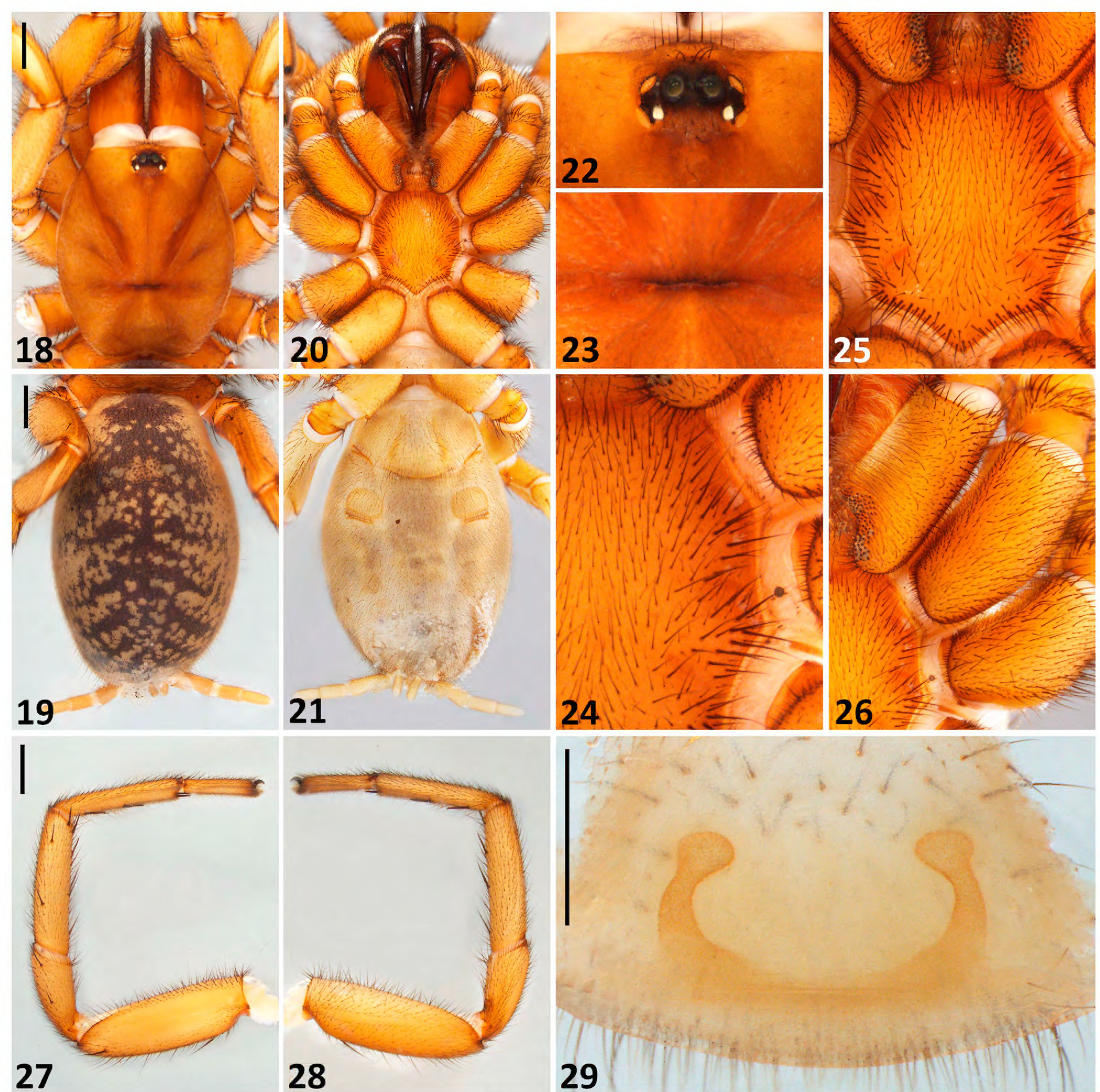
Genitalia (Figure 29): Each spermathecae with a single receptacle; each receptacle elongate (length about 3x width at crown), gently curving from an antero-lateral angle at base to an antero-medial angle distally, with a globular crown.

Remarks

This species was included in the recent molecular phylogeny of the Anamidae under the code name *Proshermacha* 'MYG435'.

Sequence data

The following sequence data are available on GenBank for this species (Harvey et al. 2018): Holotype male, WAM T114998: COI (MG800163), 16S rRNA (MG799960), 18S rRNA (MG800033), 28S rRNA (MG800110), H3 (MG800296), EF1 (MG800234).



Figures 18–29. *Proshermacha credo* sp. nov., female (WAM T110238): 18, cephalothorax, dorsal view; 19, abdomen, dorsal view; 20, cephalothorax, ventral view; 21, abdomen, ventral view; 22, ocular region; 23, fovea; 24, left sternal sigilla; 25, sternum; 26, left maxilla and anterior coxae; 27, left leg I, prolateral view; 28, left leg I, retrolateral view; 29, spermathecae, dorsal view. Scale bars = 2 mm (18, 19, 27), 1mm (29).

Distribution

Proshermacha credo sp. nov. occurs in the transition zone between the Calgoordie and Murchison bioregions (Figure 30). The habitat in this region is comprised of mallee eucalypt woodland with occasional larger trees such as *Eucalyptus loxophleba*.

Etymology

The specific epithet is a noun in apposition in reference to the type locality of this species on Credo Station, Western Australia.

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We thank Marissa McNamara for facilitating access to the small specimen laboratory at the Queensland Museum's Collections & Research Centre, where imaging of this species took place. We also thank Mia Hillyer and Joel Huey for generation of the sequence data associated with this species. Finally, we thank Bush Blitz, a program run by the Australian Government in partnership with Broken Hill Proprietary Company Limited (BHP) and Earthwatch Australia to document Australian flora and fauna. The 2011 Bush Blitz expedition to Credo Station led to the collection of several of the specimens used to

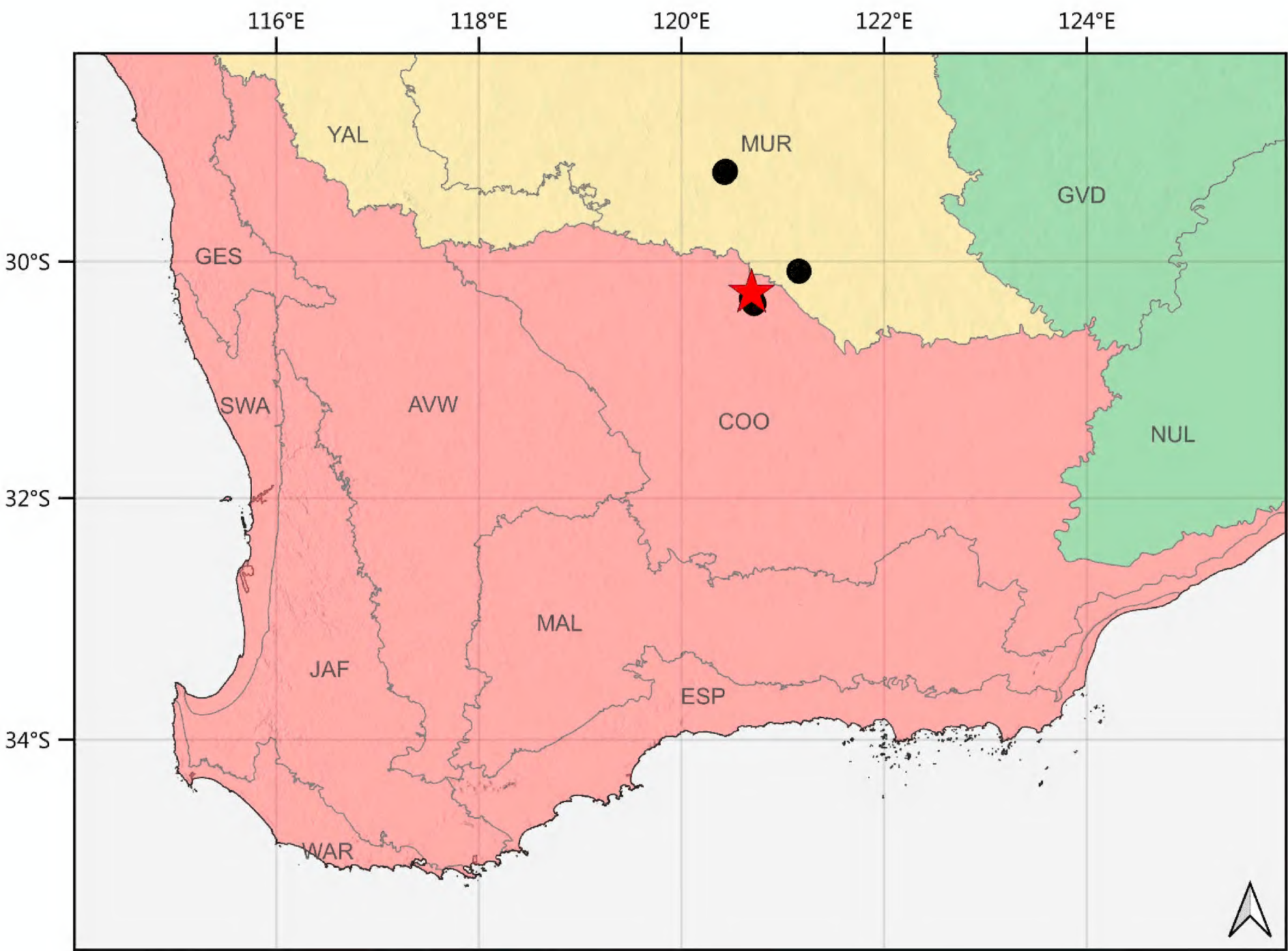


Figure 30. Distribution of examined records of *Proshermacha credo* sp. nov., from Western Australia, in the transition zone between the Calgoordie (COO) and Murchison (MUR) bioregions. The red star represents the type locality. The habitat in this region is comprised of mallee eucalypt woodland with occasional larger trees such as *Eucalyptus loxophleba*.

describe this species, including the holotype. This study was supported financially by a Bush Blitz 2021-22 Taxonomy Research Project Grant (DNP-BCK-2021-007) to the authors, and further by an ABRS National Taxonomy Postdoctoral Fellowship (4-H3KOGBR).

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